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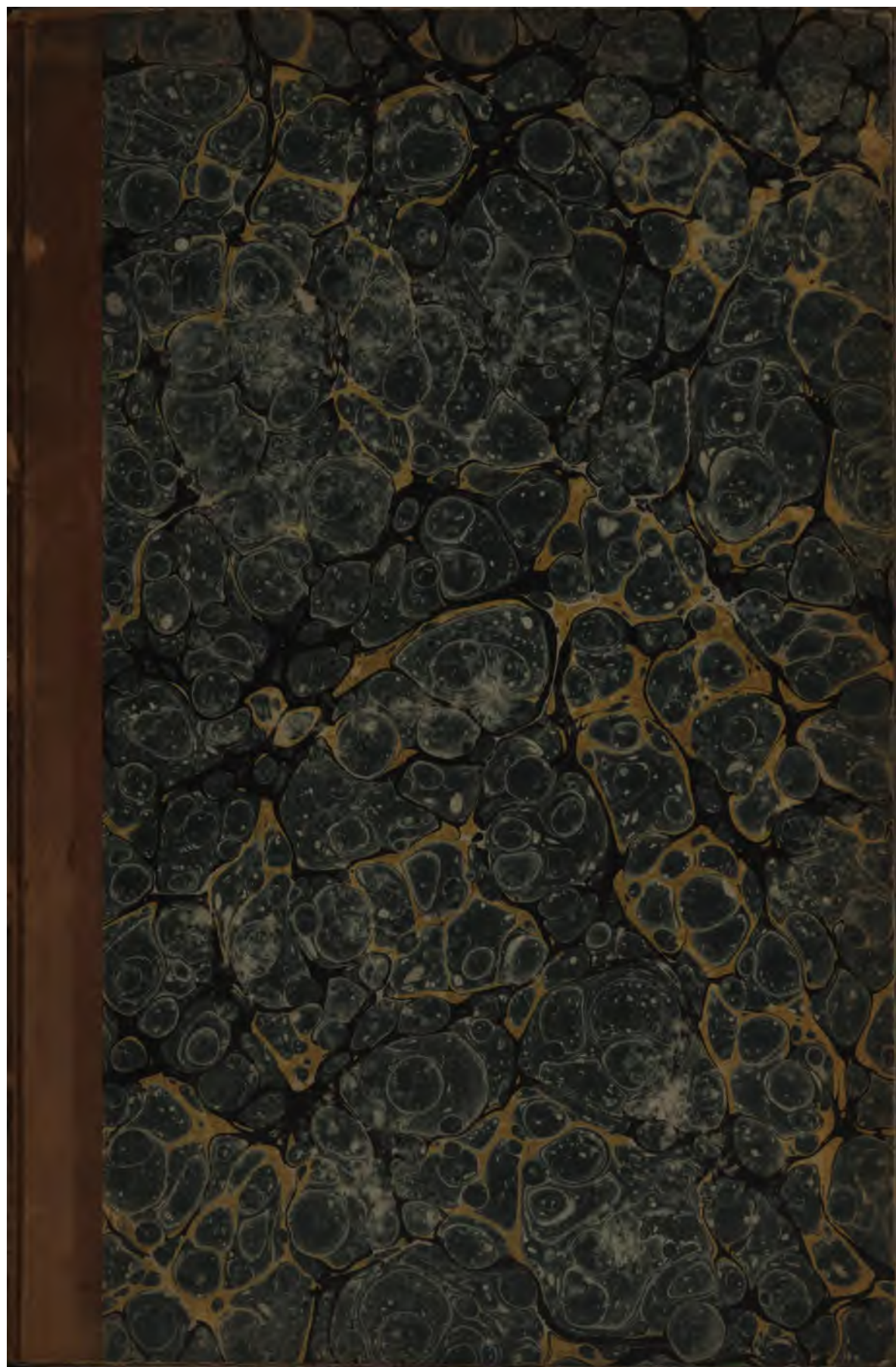
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THE  
COMMERCIAL CONSEQUENCES  
OF A  
MIXED GAUGE  
ON  
OUR RAILWAY SYSTEM  
EXAMINED.



By SAMUEL SIDNEY,  
AUTHOR OF THE "HISTORY AND PROSPECTS OF THE RAILWAY SYSTEM,"  
&c., &c.

~~~~~  
A Railway is nothing but an implement—a tool of commerce—the more costly the  
less useful.  
~~~~~

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—  
1848.

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Old Bailey.

## INTRODUCTION.

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THE following observations have been prepared as a sequel to my pamphlet, "Danger to Travellers and Injury to Shareholders threatened by a combination of the Broad and Narrow Gauges," published last year, with the view of bringing down to the latest moment all the information extant on the cost of this innovation. I do not address myself to Engineers or men of science, but to the travelling and trading public: to address our dilettanté statesmen would be useless.

Our experience, our science is useless, if the working expenses of Railways are not reduced in such a manner as to enable the Companies with profit to themselves, to reduce the charge for conveying third-class passengers, coal, ore, iron, &c.

At present, the whole tendency of Legislation runs against any reduction of Railway charges, except by enforced means, which will ruin Railway Companies.

We are proceeding with our Railways on the same prin-



ciple *as if because* the form of Sir Robert Peel's silver spade was a great improvement on the rude, long-armed tools in use in Ireland, it had been ordered that in future every labourer should either provide himself with a silver spade, or with *both* a silver and an iron one.

The Cause of Railway uniformity is the cause of the masses—of all men who cannot pay express fares.

Uniformity is as possible now as when the Gauge Commissioners' Report was made, for scarcely a yard of the additional Broad Gauge or Mixed Gauge has been laid down ; and for one-third of the cost of the Mixed Gauge Lines sanctioned, Uniformity might be obtained.

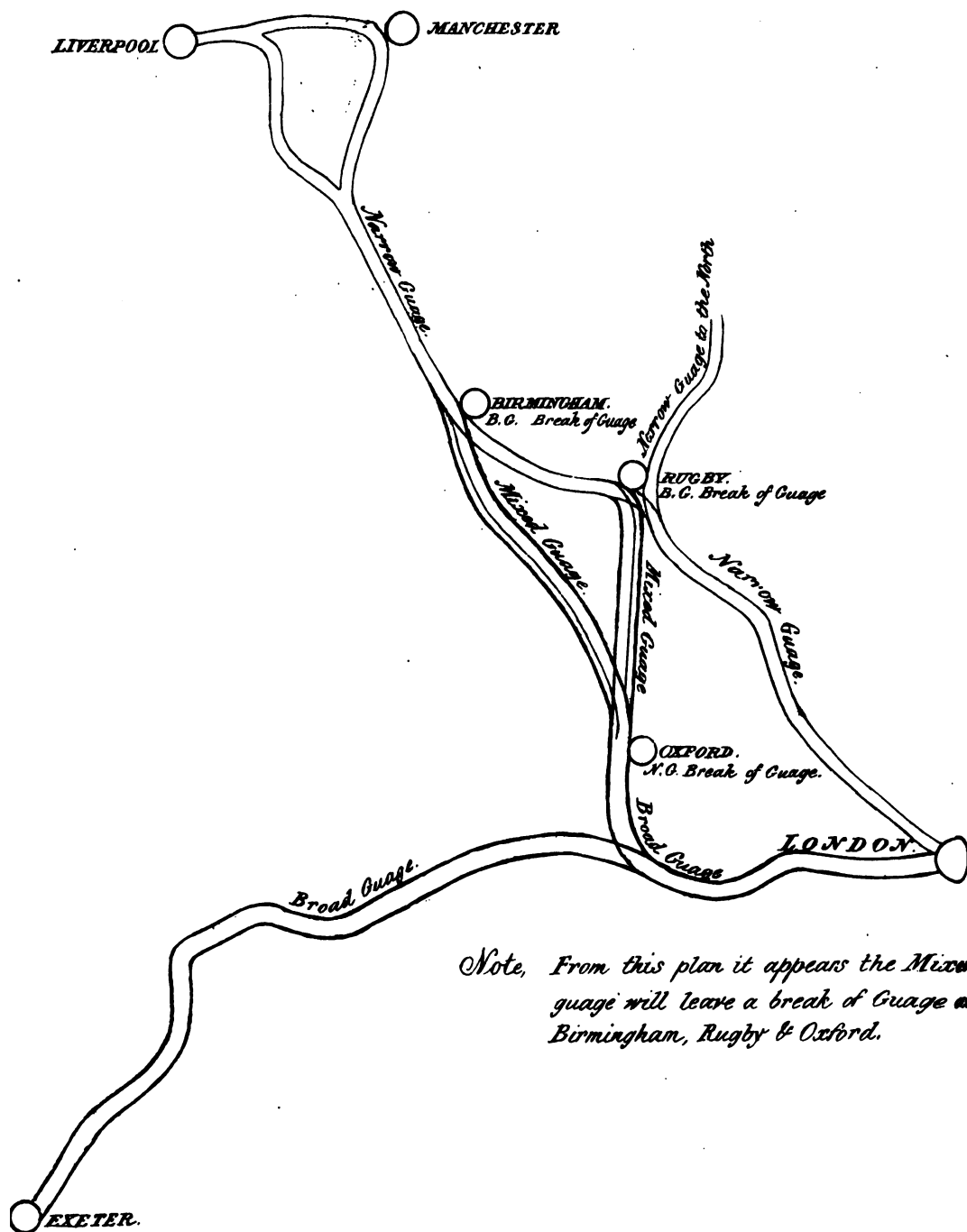
After three years of experience and expedients, now as then, I am firmly convinced that the only cure for Breaks of Gauge—the only conclusions of the ceaseless, costly contests in which the Rival Systems are engaged—lies in National Uniformity.

S. S.

*Westminster,*

*June 24th, 1848.*





THE  
COMMERCIAL CONSEQUENCES OF A MIXED  
GAUGE EXAMINED.

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*The Position of our Railway System.*

THE Railway system of England ought to be the best and cheapest in the world. Railways, like Steam Engines, were invented and brought to perfection by English Engineers. One fault, fostered by the ignorance and timidity of our Legislators, threatens to render our Railway Communication inferior to that of every other civilized country, by sacrificing all economical improvements in favour of one luxury, and perpetually excluding from cheap conveyance the great body of the working-classes, an important amount of fuel, and other low-priced commodities.

The notion of a Mixed Gauge as a remedy for the Break of Gauge, and as a compromise between the rival Broad and Narrow Gauge interests, has been favourably received by the public, in Parliament, and by the Railway Commissioners.

Captain Simmons, the engineer of the Railway Board, has reported that the two "Gauges may be combined *in one Railway, with perfect safety to the public*;" but he adds, "by avoiding all meeting *points*, by a separation of the Gauges *in the Sidings and Stations*, by most stringent regu-

lations *preventing*, under any circumstances, *the connecting in one train of carriages of different Gauges*, the line may be, by a strict compliance with these conditions, *irrespective of expense*, either of construction or *working*, rendered practically safe."

Since this report (13th November 1847) the Railway Commissioners have reported, "That it will be expedient to extend the Broad Gauge to Birmingham by the adoption of the Mixed Gauge on the Birmingham and Oxford Railway, if the experiment which is about to be tried on the Oxford and Rugby Line proves completely successful," and they intimate that it may be found advisable to extend the peculiar advantages of the Wider Gauge to other districts by the extension of the Mixed Gauge.

I shall not pause here to show, as I could, that this Board of Railway Commissioners, which originated a desire on the part of the Legislature to diminish the expenses of constructing railways—to put an end to suicidal contests and injurious competition, and to bring about a general reduction of fares and rates; and which represents the functions of the body by which the Gauge Act was framed as a final compromise of Gauge disputes—has in every instance betrayed its trust and sacrificed the interests of the great body of the public, especially of the labouring classes, to the luxurious haste of a few express passengers—has reopened and encouraged Railway contests (on which 2000*l.* a day have frequently been expended by two Companies)—has displayed the ignorance and incompetence by mistakes of the most glaring nature; for instance, a mistake of 50 miles in calculating the distance to Edinburgh; but I shall for the present confine myself to explaining, in the plainest terms, what the Mixed Gauge is, which Mr. Brunel has

finally adopted as a remedy for a Break of Gauge; and what it will cost the Companies which adopt it, and the country on which it is inflicted.

This is not an engineer's question; there is no mystery about it: it is perfectly within the comprehension of any one acquainted with the simplest rules of arithmetic.

We have been taking great pains, and have made some sacrifices, in order to obtain all foreign commodities of daily use as cheaply as possible.

The Whig ministers, supported by the most able men among Sir Robert Peel's friends, are engaged in repealing the Navigation Laws, with the view of reducing the cost of sea-borne conveyance. With the same view, we have resigned a profitable tax on timber.

Certainly, cheap inland conveyance of passengers, merchandise, minerals, and other commodities, is of not less moment than cheap sea conveyance. It is of as much importance that corn should come at the lowest possible cost from Norfolk and from Lincolnshire as from New Orleans or Odessa.

Our Railway Commissioners have adopted a course which will prevent any reduction of Railway charges from ever taking place, and which will turn toward *competition* capital which would otherwise be directed toward making Railways in new districts.

Our Railways have cost more money to construct than Railways in any other part of the world.

From the number of trains per day, and the speed at which these trains travel, they also cost more to work.

Among the items of wasteful expenditure most prominently brought before the Select Committee (which in 1843 obtained third class trains for the working-

classes) were Parliamentary expenses, and the *unnecessary cost of construction*. The last item was then calculated by a Railway statist at upwards of £7,000 a mile.

All circumstances being equal as to ground traversed, Narrow Gauge Lines are practically the cheapest to make. In flat ground, 500*l.* a mile cheaper ; on difficult ground, where embankments are lofty, cuttings deep, tunnels, viaducts, and bridges frequent, the extra expense might be from 10,000*l.* to 20,000*l.* a mile cheaper than the Broad Gauge.

The Broad Gauge stands next in point of expense to the Narrow Gauge.

The Mixed Gauge must be always one-half more expensive than either the simple Broad, or the simple Narrow Gauge.

The additional expense of converting a simple Line of Railway of any extent (say fifty miles) and any traffic into a Mixed Gauge cannot be less than 10,000*l.* a mile and may be 20,000*l.* a mile.

This is the system which our Commissioners of Railways patronize. Instead of devoting themselves to measures for saving national capital and reducing rates, they encourage the waste of thousands of pounds in a manner which will increase danger and impede traffic without accommodating a single additional passenger or additional ton of goods.

If Mr. Brunel had admitted, when he proposed to introduce an exceptional Gauge, the evils of the Break of Gauge, he would not have been allowed to introduce it at all.

If, when the evil of a Break of Gauge became apparent, he had stated truthfully that he intended to cure it by

pushing on the Broad Gauge from town to town wherever a traffic was to be obtained, his schemes would have been crushed in the bud.

But he began by asserting that he had in preparation mechanical expedients which would entirely obviate the evils of a Break of Gauge, and when parliamentary committees believed him and granted him his projects for creating more Breaks of Gauge, he abandoned his experiments and mechanical devices and promised to dissolve the barrier of the Break of Gauge by a Mixed Gauge at a cost of about 2000*l.* a mile. Had the public been aware that this 2000*l.* would eventually swell to 20,000*l.*; there would not, in the year 1848, have been any reason for seriously discussing the Mixed Gauge. It will be well, in order to avoid all mistakes, to describe it.

### *The Mixed or Three-Railed Gauge.*

The theory of a Mixed Gauge consists in rendering a Railway capable of accommodating indifferently the engines and carriages of either the Broad or the Narrow Gauge. In the Mixed Gauge a third rail is proposed to be added to each pair of rails, whether Broad or Narrow, thus                     

If Railways consisted of unbroken rods of iron from end to end, there would be no difficulty at all in the arrangement, and only some useless expense.

Wherever a Railway is intersected by another Railway, or wherever arrangements must be made for turning off the main line, there the rails are cut and intersected. In Stations it is necessary to be continually moving carriages



and waggons about, and from side to side, and where many lines meet, the ground becomes intersected with a real iron net-work ; but, instead of knots, there are pieces cut out where the Lines cross. Some of these crossings are fixed *points*.

There are also, to assist in the movement at Stations, moveable pieces of rails moved either by self-acting machinery or by hand ; these are called *switches*, which are generally under the charge of switchmen.

The safest part of a Railway is where it is continuous ; wherever you cut it there is a jar when a carriage passes, and this jar is the most obvious cause of fractured axles. Wherever there is a *point* there is danger of the wheels running off ; wherever there are switches there you must depend on the vigilance of the *switchman*.

All these notches, points, and switches, must be multiplied by a Mixed Gauge, and the switchmen also must be increased in number.

Wherever one Railway crosses another, or wherever it is necessary to arrange for crossing from one Line to another, or wherever a branch or mineral Line communicates with a main Line, there is a certain degree of complication and expense, and watchfulness required.

On 112 miles between London and Birmingham, there are fifty-eight crossings, the complication of which and the labour of which would be doubled and trebled by the Mixed Gauge. On lines in the North, where coal traffic is great, the proportion is greater.

On every Railway there are a number of *Sidings* ; that is to say, short pieces of double or quadruple Railway, to enable Slow Trains to draw off the main Line and rest *on one side* while Fast Trains pass, or to accommodate local traffic

by allowing trucks and carriages not in use or loading to rest on *one side*, out of the way of the main Line, and for many other purposes.

Therefore, it must be remembered that in a Line of Railway from one town to another, in addition to the two roads up and down, it is necessary to provide machinery and arrangements for moving about the stock of carriages in the *Stations*, for *crossing* by other Railways, for *crossing from the up Line to the down Line*, and *vice versa*, and for *Sidings*.

All these arrangements form an important item in the expenses of making a Railway Line.

Therefore the work of transforming a Simple Railway into a Mixed Railway, is only half done when a single third rail is laid down from one extremity to the other. This brings me to the question of cost.

### *The cost of the Mixed Gauge.*

Mr. Brunel, the only engineer who patronizes the Mixed Gauge, has always avoided giving any details of his plans for working it. Mr. Robert Stephenson, Mr. Locke, Mr. Wyndham Harding, and others, have always asserted that, in addition to other serious disadvantages, separate Stations, separate Sidings, besides a vastly increased number of points and switches would be required, in order to work the Mixed Gauge with any degree of safety and efficiency. And also that a double stock—viz., engines, carriages, trucks, and an increased staff of clerks, porters—would be indispensable to work traffic which might easily be disposed of with a single set of Rails, plant and staff on a Simple Railway.

Mr. Brunel, in his offhand way, has pooh-poohed all these objections with a generality, such as, that he “never could see the difficulty,” &c.

It appears that Mr. Stephenson and his friends were right, and Mr. Brunel was wrong, if he ever intended to work the Double Gauge, which I doubt.

Captain Simmons evidently considers that his only duty is to report whether it *is possible* to do a certain thing.

The commercial part of the question does not concern him.

He requires on the Oxford and Rugby Line, the model Line, that there shall be—

1. Separate Stations. (*A separation of the Gauges in Stations, is equivalent in cost to the Double Station room.*)
2. Separate Sidings.
3. Distinct trains of Broad and Narrow Gauge carriages.
4. That the details of the execution of the Lines *be effected irrespective of expense.*

I will proceed to examine what will be the cost of a Mixed Gauge, executed in the manner which Captain Simmons considers indispensable for safety. It is as well the Railway public should know that our Railway system is to be executed in future *irrespective of expense.*

The following is Mr. Stephenson's estimate, from the Appendix to his Observations on the Double Gauge, which has been laid before Mr. Brunel, but which he has not ventured to impugn:—

*Estimate of the Expense of adapting a Broad Gauge Railway to a Narrow Gauge Traffic in addition to Broad Gauge Traffic, under the Three Rail arrangement suggested by Mr. Brunel.*

EXPENSE PER MILE ADDITIONAL.

<i>Permanent way</i> . . . . .	£2,695 0 0
Mr. Brunel's estimate, given at page 367 of the Appendix to Report of Gauge Commissioners, is—	
(The rails being taken at 10 <i>l.</i> per ton) £2,500 0 0	
To this must be added, for additional ballast admittedly omitted by Mr. Brunel, per mile . . . . .	195 0 0
	<hr/>
	£2,695 0 0
<i>Sidings</i> , derived from the actual cost on the London and Birmingham Railway, per mile . . . . .	150 0 0
<i>Points and Crossings</i> , derived from the actual cost on the London and Birmingham Railway, per mile . . . . .	194 0 0
<i>Passenger Stations</i> , allowing nothing for additional platforms or offices, a very moderate additional shed-room at Road Stations, only 1,800 <i>l.</i> additional for shedding at each terminal station, and nothing additional for land . . . . .	172 0 0
<i>Goods Stations</i> . . . . .	688 0 0
For very moderate accommodation, if the stock is to be kept separate, as shown to be necessary from considerations of safety and convenience in Remarks (page 13).	
<i>Plant</i> . Taking only <i>half</i> of the actual cost of the plant per mile on the London and North-Western Railway, and allowing one engine and tender for every two miles .	2,075 0 0
Additional per mile of double way .	<hr/>
	£5,974 0 0

*Additional annual cost of working a Mixed Gauge. Expense per Train per Mile on the London and Birmingham Railway.*

The following Table shows the Expense of Passenger Trains. That of Goods Trains is greater by 8*d.* per train per mile.

	Actual Expense on the London and Birmingham Railway.	Proportion chargable on Trains upon the Additional Gauge.
	<i>s. d.</i>	<i>s. d.</i>
Maintenance of Way . . .	0 5½	0 2
Locomotive Power . . . .	1 0	0 11
Police . . . . .	0 2	0 0½
Coaching and Merchandise . .	0 7½	0 3½
Coach and Waggon Repairs .	0 2½	0 2
Depreciation of Stock . . .	0 4	0 3
Mileage Duty . . . . .	0 5½	—
Rates and Taxes . . . . .	0 3	—
General Charges . . . . .	0 2	—
Total . . . . .	3 8	1 10

Nine additional Trains per day each way, for 312 working days, would amount to  $9 \times 2 \times 1s. 10d. \times 312 = 514l. 16s.$  per mile per annum additional.

Say 500*l.* per mile additional.

The average expense of working thirty-six Passenger Railways per mile (according to Mr. Laing's Statistics of British Railways, page 14) was about 1400*l.* per annum.

The additional expense of working a Mixed Gauge Railway, as compared with a Single Gauge Railway, is thus taken at something more than one-third of the whole expense of working a Single Gauge Railway.

"It will be seen that the additional expense of laying the Narrow Gauge, with the necessary facilities for working it, on a Broad Gauge Railway would be about 5,974*l.* per mile, while the increased annual expense would be at least 500*l.* per mile per annum. This latter estimate is founded on a return of the actual cost per train per mile on the London and Birmingham Line, where, from the great number of trains, the cost per train is low.

"If we capitalize this annual expenditure of 500*l.*, it will amount, at four per cent., to 12,500*l.* Adding to this 5,974*l.*, the total additional cost of a Mixed Gauge Line would be 18,474*l.* a mile."

It may give some idea of one item of expense entailed by the Mixed Gauge to state, that at the Station at Slough the present number of switches is 37. If the Great Western were converted into a Mixed Gauge Line, the switches alone would be increased in number to 77; and, as the contract price of each switch for the Birmingham Railway is 50*l.*, the additional expense for that article alone would be 200*l.* at one Station. This is one of the most trifling instances of increased expense.

When it is taken into consideration that these Mixed Gauge Lines are always proposed by the Great Western Company, in order to substitute the costly Broad Gauge system for the cheap Narrow Gauge, it may safely be affirmed that the additional expense of adding the Broad Tri-Rail to a simple Narrow Gauge Line will frequently amount to 30,000*l.* or 40,000*l.* a mile. For instance, in such a country as that traversed by the Manchester and Sheffield, or Manchester and Leeds, or on the Taw Vale or Yeovil and Exeter Railways.

*Commercial Results of the Mixed Gauge.*

It may be asked—Of what consequence is it to the country if the Great Western Company choose to spend or waste their money in making a Mixed instead of a Simple Gauge Railway, or in any other folly?

I answer—Without dwelling on the increased dangers of the Mixed Gauge; its complication and unsuitability for mineral and agricultural traffic; without laying any stress on the false pretences under which the Broad Gauge has been extended; even for the moment admitting (what is a perfect fallacy) that the Mixed Gauge dissolves the barrier of the Break of Gauge;—still I answer that, in a commercial point of view, the waste of capital involved in the Mixed Gauge, or any other useless undertaking, is a most serious *national evil*.

From 1839 up to 1843, Select Committees of the House of Commons were constantly engaged in considering how the advantage of Railway conveyance might be secured to the labouring population.

The cheap Parliamentary trains were the result of these investigations.

When the Railway department of the Board of Trade, from which emanated the Railway commission, was instituted, it was expected that successive reductions of Railway fares and rates would take place.

All the advocates of cheap and frequent trains for the benefit of our peasant and mechanical population, consider the high fares and limited third-class accommodation of English Railways the result of the excessive cost of their execution.

It is quite certain that extravagant expenditure involves either high fares, or low dividends to Shareholders. An unprofitable Railway not only discourages Railway investment, and acts as a beacon to affright those who would otherwise confer the benefit of Railway communication upon new districts, but invariably conducts its affairs in a niggardly, dangerous, and unsatisfactory manner.

Foreigners, especially Americans, are astonished at the manner in which we waste capital on luxuries, and tax the fares of working-men.

An American Railroad Director, in his letters from England, observes :—"The masses are denied the privilege of travelling by Railway, in the hope of extracting from the few what would be cheerfully paid by the many," and that "our (the American) policy is not to punish travellers for their poverty, but to give them comfortable accommodation."

This American Director would have been indeed amazed if he had found us, as he would now, engaged adding to our sufficiently costly Narrow Gauge the Mixed Gauge as well as the Broad Gauge, which he thus describes :—

"This Line" (the Great Western) "has a track seven feet wide, and is one of the most costly in England, expense having been disregarded in the attempt to reduce it, as nearly as possible, to a dead level. There is no doubt that width to the track admits of rather more speed ; but there are countervailing objections, which will prevent the general adoption of wide tracks in America. As you widen your track, you must increase, in the same proportion, the cost of the cuts and embankments ; you must increase the length of the axles of every engine and car. As you increase the length, you must add to the diameter of the axle and size of the wheels. The dead-weight of the train is thus rapidly augmented ; the capacity for freight and passengers is diminished, *or a weight injurious to the rails is thrown upon the wheels.* Extreme speed, too, is purchased by increased



weight and wear and tear of the engine and cars. I am also satisfied that the speed which we attain on our own lines is sufficient for all practical purposes."\*

This, then, is the opinion of a Railway Director from one of the most acute money-valuing countries in the world—the *go-a-head* country *par excellence*—on the extra expense of the Broad Gauge: What would he have said to the Mixed Broad Gauge?

### *Financial effect.*

There is another extraordinary anomaly in the time at which we are entering on this costly and deceptive compromise.

All the great financiers, bankers, and City merchants, are of opinion that more than half our distresses arise from excessive Railway speculation—from too many Railways—the *Times* says so, and the City agrees with the *Times*.

The Legislature has occupied itself with expedients for delaying the progress of Railway works. A pause in the execution of Lines for which powers have been obtained is recommended almost universally by Railway Directors.

In this state of things the Railway Commissioners by implication advise, that wherever there is a district capable of affording a profitable traffic, instead of being content with one *Railway*, the spare capital of the country should be sunk in a *Railway and a half*; that is to say, on one permanent way three Rails, a double number of Stations and Sidings, a duplicate set of Broad and Narrow Gauge engines, carriages, trucks, &c., and a proportionate increase of engine-drivers, switchmen, police, &c.

\* "Two Months Abroad," by a Railway Director of Massachusetts, Boston.

*The Mixed Gauge Theory reduced to Figures.*

To relieve the depression that reigns over the industry of the country, new sources of wealth should be developed, and means adopted for stimulating our languishing commerce.

Railroad conveyance has already been of great service to our manufactures, to our sea-ports, and to our mines ; it has done less for our agriculture.

It has been an immense economy and luxury to our aristocracy and middle class ; it has done less, comparatively, for our labouring classes.

The amount of conveyance to be derived by first class passengers—I mean by that class which formerly travelled by post or inside the mail—is not much affected by price. The highest fares on a Railway are much cheaper than the inside fare of a fast coach. Those whose rank compelled them to use four posters now effect an enormous economy. A duke, who formerly came up to town with at least two carriages and eight horses, now contents himself with a first class seat for himself, and a second class for his servant.

To second class passengers Railways are frequently a valuable part of their stock in trade ; certainly a saving over coach travelling in cost, as well as a money gain in time.

Third class passengers stand in a very different position. They have frequently no choice between an early Parliamentary train at 1*d.* a mile and walking.

The mechanic, haymaker, ploughman, or drover, who has not 8*s.* 4*d.* to pay for a journey of a hundred miles, or who

has arrived in the town too late for the solitary daily train, must walk, and perhaps lose a day's labour and a day's pay.

What would 20,000*l.* a mile—the cost of converting the Broad Gauge Line into a Mixed Gauge, that is to say 20*l.* a week per mile—saved or expended in lowering fares do for these people?

Are the labouring classes the least valuable portion of our community? and is the power of distributing labour where it is required the least valuable power of a Railway?

The goods traffic may be broadly classed in the same way.

Merchandize, silks, tea, &c., can bear heavier rates than timber, agricultural produce, live stock, and coals.

On cheap coals rest the basis of our manufacturing pre-eminence.

On the cheap conveyance of their corn and cattle, of lime and manures, our agricultural counties depend, to enable them to sustain foreign competition.

When I state that the Railways between Sheffield and the north coast of Lincolnshire, intersecting some of the most productive land in the kingdom, will be completed and opened for traffic, engine and carriage stock included, at a cost of less than 20,000*l.* a mile, it will be seen that the Mixed Gauge system involves a sacrifice equal to the complete construction and stock of a first-rate Narrow Gauge Line.

The South-Western have Railways open at 17,000*l.* a mile, and the Norfolk Companies at even less. The West of England has hitherto been excluded from the benefit of cheap convenient Railways. The only chance which the

farmers and miners of that district lies in the extension of a cheap and simple Narrow Gauge Line.

STATEMENT of DOUBLE GAUGE RAILWAYS sanctioned and proposed up to the year 1848.

*Oxford, Worcester, and Wolverhampton.*

Abbotswood and Wolverhampton, between Abbotswood and Worcester . . . . .	40
Oxford and Rugby . . . . .	50
Cheltenham and Oxford . . . . .	40
Swansea Vale . . . . .	14
Gloucester and Bristol . . . . .	37
Gloucester and Cheltenham . . . . .	7
West London . . . . .	3
	<hr/>
	191

*Proposed in 1848.*

Birmingham and Oxford, including branch to Stratford . . . . .	42
Birmingham, Dudley, and Wolverhampton . . . . .	14
Yeovil to Exeter . . . . .	45
Oxford to Basingstoke . . . . .	40
	<hr/>
	141

The cost of, say, in round numbers, 190 miles, at 20,000*l.* a mile, would amount to 3,800,000*l.*, which, taking the annual interest at 5*l.* per cent., would give an annual income of 190,000*l.*—a sum sufficient to convey over that distance, for nothing, all the passengers which are now conveyed for 1*d.* a head, or 1*d.* a ton;—that is to say, 240,000 third class passengers, who now pay 1*d.* each per mile, might be carried 190 miles for nothing; or 240,000 tons of coal, or of iron, or of copper ore, might be conveyed 190 miles free, or 480,000 tons at a reduction of  $\frac{1}{2}$ *d.* a ton.

We have it in evidence that the difference of  $\frac{1}{4}$ *d.* a ton in cost has decided on the opening or abandoning of a coal mine.

The maximum tariff for the conveyance of coals on the principal lines is only 1*d.* per ton per mile.

In the North, there are Railways which convey coals at the rate of nine miles an hour, for  $\frac{1}{2}$ *d.* per ton per mile.

The rate for conveying iron in bars varies from 1*d.* to 1 $\frac{1}{4}$ *d.* per ton. The iron of Wales is wanted to mix with the iron of Staffordshire. The ore of Devon and Cornwall cannot compete with the slave-raised copper, unless a cheap railway communication can be found to the northern ports of those counties, for the purpose of sea-conveyance to Wales.

The question we should ask is, Whether the demands of a few express passengers are a sufficient excuse for destroying our Simple Railway system, and sinking a capital, which, if either the country or the Railway Companies are able to spare it, would be more usefully and more profitably employed in distributing labour in the shape of third class passengers, and in distributing the elements of labour in coal, ores, iron, timber, corn, cattle, and manures.

Thus, then, we see what a tax, either in *commission* or *omission*, an extension of what the Commissioners call "the peculiar properties of the Wide Gauge," by means of the Mixed Gauge, will inflict on our coal, our corn, our cattle, and, above all, on our third class passengers; these peculiar properties consisting in accommodating a few wealthy individuals by a trifling additional speed on express trains.

The importance of the third class traffic may be seen from the following analysis of the passenger traffic of the kingdom, prepared from the returns recently published by the Railway Commissioners for the year ending 30th June, 1847 :—

	NAME OF RAILWAY.	Total number of Passengers.	Number of 3rd Class Passengers.	Proportion in every 100 Passengers of 3rd Class Passengers.
Narrow Gauge Railways.	London and North-Western	5,599,734	2,163,384	39 { 3rd-class passengers in every 100 passengers.
	Lancashire and Yorkshire ..	2,889,205	2,090,624	72 do.
	South-Eastern .....	4,158,732	2,008,230	48 do.
	Midland .....	3,618,799	2,366,892	65 do.
	Newcastle and Berwick ....	1,187,515	944,891	80 do.
	Edinburgh and Glasgow ....	1,147,883	836,025	72 do.
	East Lancashire .....	919,222	677,896	74 do.
	Eastern Counties .....	2,074,170	1,044,158	50 do.
	Arbroath and Forfar .....	124,462	113,545	91 do.
Broad Gauge Ry.	Great Western .....	2,876,222	419,663	15 do.

If these returns are compared with the populations of the towns traversed, it will be seen that the Great Western, traversing a district thickly dotted over with towns, has confined its efforts to accommodating express passengers, and has never given the numerous populations of the poorer classes the accommodation which has invariably been extended by Narrow Gauge Lines.

In the face of these figures, and of the following tables of fares, it is vain for the advocates of the Broad Gauge to boast of the power and economy of their system. Between 1843 and 1847 the third-class traffic of the kingdom has increased from six millions and a half to twenty-two millions and a half; during the same period the first-class traffic has only increased from four millions and a quarter to six millions and a half. By my first table, I show that out of this enormous increase of third-class traffic, that is the con-

veyance of labouring men, while the Narrow Gauge Lines have conveyed from 50 per cent. of third-class passengers on the Eastern Counties, to 91 per cent. on a Scotch Line, out of their gross traffic, the Broad Gauge has only accommodated 15 per cent. of poor men out of nearly three millions of passengers conveyed. This exclusion of labouring men by the Great Western cannot be attributed to local circumstances. The district traversed is much more populous than the Eastern Counties or almost any Line quoted; in fact, it is in numbers, excluding third-class passengers, the second traffic in the kingdom. Where are there populations more numerous than those anxious to travel between London, Windsor, Maidenhead, Reading, Oxford? Between Bath and Bristol, between Bristol, Bridgewater, Taunton, Exeter, and the South Devon termini? The fact is, that to all these important towns the Broad Gauge Great Western only allows the number of third-class Trains enforced by law, travelling at the slowest pace allowed by law, stopping for the longest periods, and starting at the most inconvenient hours.

If we turn from the number of Trains for poor labouring men, to the fares of the Broad Gauge, which Messrs. Brunel and Gooch prove to be so economical, we find the Great Western charges on an average 33 per cent. on every class more than the Narrow Gauge Metropolitan Lines. For what the Eastern Counties charges 210 pence, the London and North-Western 218·1 pence, the Brighton 263 pence, the Broad Gauge Great Western charges 274·4 pence. The average for all classes of passengers on Narrow Gauge Lines is 141·3 pence, on Broad Gauge Lines 188·9 pence.

When we consider that the Great Western has been more successful than any other Railway in its Parlia-

mentary contests ; that it has never suffered from competition ; that it has enjoyed these high fares ; — when we consider its present notorious desperate financial position — in debt five millions sterling, without credit to obtain any money on debentures, without any capital on hand—it is impossible not to wonder what has become of the money which ought to have been saved, according to Messrs. Brunel and Gooch, by their economical system. If this is the result of the Broad Gauge, what will be the result of the Mixed Gauge ?

The following table proves that the fares of the Broad Gauge are as much against the public, as the arrangements of the third-class are opposed to the claims of labour :—

NAME OF RAILWAY.	FARES FOR 100 MILES.				
	1st Class.	2nd Class.	3rd Class.	Average fare paid by each passenger *	
Eastern Counties .....	Pence. 210.	Pence. 141.5	Pence. 92.1	Pence. 125.4	Narrow Gauge Railways.
London and North-Western .....	218.1	144.6	91.4	138.6	
London, Brighton and South Coast.....	263.	171.	109.	150.6	
London and South-Western .....	245.	168.	96.	166.3	
South-Eastern (Broad Gauge).....	214.	152.	90.	131.8	
Average fare paid on Narrow Gauge } Railways †.....	226.7	152.8	97.	141.3	Broad Gauge Railways.
Great Western (Broad Gauge) .....	274.4	187.8	100.	188.9	
From these figures it appears that the excess of Broad Gauge over Narrow Gauge fares, on the Metropolitan Railways is, per cent., on .....	1st Class. 21.	2nd Class. 22.9		On the average, fare paid by the public. 33.7	

\* That is dividing the sum total of fares by the sum total of passengers.

† In this calculation the average is obtained in the correct manner, viz., by dividing the sum total paid by each class of passengers by the total number of each class travelling.



It must not be forgotten that the fares of even second-class passengers, by Broad Gauge express trains, are as high as first-class passengers by Narrow Gauge Lines. Therefore, the parties accommodated by express trains only form a portion of first-class passengers, and certainly not five per cent. of the traffic of the kingdom.

*Practical Conclusions.*

My readers can now be under no mistake as to the cost of the Mixed Gauge. If they think my calculation too high, which I am sure it is not, when the cost of rails, sidings, stations, additional stock, and additional wages, is taken into consideration, not counting the cost of increasing Narrow Gauge embankments, viaducts, and bridges, to Broad Gauge dimensions; making a deduction of even 50 per cent. from my estimates, they will still find the loss enormous.

We cannot have our cake and eat our cake. There is no question that a simple Narrow Gauge Line would do more efficiently everything that a Mixed Broad Gauge professes to do, so far as agricultural, mining, manufacturing, second-class, and third-class passenger convenience and practical utility go.

If on a luxury we expend an additional 10,000*l.* or 20,000*l.*, we have that sum less to expend in reducing fares or extending Branch Lines to new districts, in opening mines, and in sending our farming produce from distant counties to market.

There might be some consolation if the Mixed Gauge when completed was superior to ordinary Railways. On the contrary, it is certain that it is infinitely less convenient and much more dangerous.

*Danger of Mixed Gauge.*

It is perfectly clear that the more you cut and intersect a Railway, that the more you have to depend on the vigilance of switchmen and the care of plate-layers to keep the road in perfect order, the more dangerous travelling becomes.

It is all very well for a soldier like Captain Simmons, brought up with ideas of military discipline, and without any ideas of profit and loss, to talk of Railways being made and worked in perfect order, "irrespective of expense." In practice, and on a long length of line, especially if the line does not pay well, it cannot be done. Maintenance of way is an enormous expense—an expense constantly increasing in consequence of the weight and speed of the new express engines. Economy must be effected somewhere, as long as dividends have to be kept up and paid. It is easier to effect it without attracting hostile actions in labour than anything else. A reduction of policemen and switchmen, the line less perfectly kept up, and money is saved—hence, accidents.

We find by Mr. Stephenson's remarks on Mr. Brunel's plans for the Oxford and Rugby,—

That the Three Rail Mixed Gauge system about doubles the amount of obstructions on the Main Line from gaps and meeting-points. But, that the number of trains on the Mixed Gauge must be doubled, in order to convey the same amount of traffic with equal convenience to the public as a Single Gauge Line under a uniform system,—that, even using the Three Rail system as the simplest, the mixing of Gauge at least quadruples the amount of obstructions arising from gaps and meeting-points on the main line of rails; and to the same extent, *at least*, increases the danger of accidents from this source, to which seven-eighths of the accidents resulting from engines and carriages getting off the rails are to be attributed."

Last year before the Committee on the Stour Valley Railway, Mr. W. H. Barlow put in a table showing that twenty-one accidents on 300 miles of the Midland Railway from Engines or Trains getting off the Rails were attributable to switches, and seventeen to crossing points, and one only from unascertained causes.

From an analysis which I have made from the return of accidents, ordered by the Railway Commissioners, I find that twenty-two cases of accident were investigated by the Commissioners. The whole number of persons killed and injured by circumstances beyond their control amounted to sixty-one. All the other serious accidents from causes for which the parties themselves were answerable.

The number was made up thus—

Passengers injured . . . . .	39
Do. killed . . . . .	5
Servants of Company or Contractors injured . . . . .	8
Do. killed . . . . .	9
	<hr/>
	61

If from this number, two persons killed, and two persons injured, by the breaking of the wheels of a Great Western Express Train . . . . . 4

And three killed and twenty injured by the breaking down of the Girder Bridge at Chester . . . . . 20

In all . . . . .	24
Be deducted . . . . .	24

It will leave . . . . .	37
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accidents to life and limb, *thirty-three of which occurred from accidents by collision, or Train or Engine going off the Line at switches, points, and crossings.* The accident at Wolverton, by which seven persons were killed and four were wounded, arose from the mistake or default of a switchman.

In addition, there are reported eleven accidents to Trains or Engines of more or less gravity, attributable, there is no doubt, to shocks received at points and crossings. It will be found that the more numerous these intersections, the more numerous those cases of fractured axles which arose from the mistake or default of a switchman ; and, since that time, a frightful accident has occurred on the Great Western Line, by which all the passengers in a second-class carriage were either killed or wounded at a junction with a Branch Line, in consequence of delay in moving one of the tremendous Broad Gauge horse-boxes. Add the complication of the Mixed Gauge, and such accidents will be of constant occurrence.

Thus, then, in addition to the expense of from 10,000*l.* to 20,000*l.* a mile added to our already too expensive Railway system, a new source of danger will be prepared for the public by increased complication of the system, by the increase of the number of switches, points, and crossings at which the most serious accidents have occurred.

To Shareholders I would remark that the accident at Wolverton cost the London and North-Western Company upwards of forty thousand pounds in compensation ; and the accident near Steventon will, probably, cost the Great Western, considering the position and fortune of the parties killed and wounded, not far short of sixty thousand pounds.

*The Mixed Gauge, by an Eye-witness.*

As I am not an engineer, and only incidentally allude to engineering objections to the Break of Gauge, I shall here

quote from the account given (*Railway Chronicle*) by an engineer of the Mixed Gauge between Gloucester and Cheltenham—a short Line, with no cross traffic, and no Stations between the termini—in fact, a Line, where, if anywhere, the laying of a Mixed Gauge is “as plain as a pike-staff.”

From Gloucester southwards to Standish, a distance of about seven miles, there is a Broad Gauge Railway, used in common by the Great Western Railway Company for the traffic between Gloucester and Cheltenham *via* Swindon to London, and by the Bristol and Birmingham section of the Midland Company's Lines, for their traffic from Gloucester to Bristol—the Bristol and Swindon Lines (both on the Broad Gauge) diverging at Standish.

From Gloucester northwards, the Narrow Gauge of the Midland Company proceeds to Birmingham; and between Gloucester and Cheltenham, in addition to the Narrow Gauge Rails, the Great Western have laid a third rail on each track, to allow of Broad Gauge Trains running to Cheltenham, where they have a separate station from the Midland Company. Between Gloucester and Cheltenham, there is thus the first example of a Mixed Gauge Railway.

On arriving at about three-quarters of a mile from the Gloucester Station by an express train from London, I found that our train was turned by a switch (meeting the train) across the *Up*\* Line of the Bristol and Gloucester Railway. When we had gone about two hundred yards further, we crossed a turntable on the main line, and pulled up. As we crossed this turntable, I perceived with some dismay an engine and two carriages approaching us at a distance of about fifty yards, upon a line of railway which crossed the turntable which we had just passed over at right angles to the line on which we were running. This engine and train having stopped (fortunately in time, or of course it would have cut our train in two), several passengers got out of their carriages and made for our train, one or two with luggage in their hands—an annoying proceeding to them, as it was raining hard at the time, and the platform is uncovered. Two carriages of our train were then detached by means of

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\* By the term “up line,” I refer to that line of rails on which the trains from Cheltenham to London or Bristol run. The “down line” will consequently be that line on which the trains from London or Bristol run.

the turntable which has been mentioned, and were taken back by the engine on the "Spur" Line, as it may be termed, to Gloucester, while we proceeded to Cheltenham.

All passengers from Gloucester to Cheltenham, and from Cheltenham to Gloucester, a distance of seven miles, by any of the through Broad Gauge Trains, have thus, it will be seen, to change their carriages on an exposed platform a mile from Gloucester.

This very objectionable mode of working the Gloucester traffic as a branch traffic, with a separate engine and train for the branch, such branch being less than one mile long, and cutting the main line at right angles (the junction being effected by a turntable), is the result of the lines of two different Gauges meeting at Gloucester in the station as in a *cul de sac*, so that the station lies off the road altogether, and can only be reached by a branch; which is itself the consequence of the lines north of Gloucester being of one Gauge, and those south of Gloucester being of another Gauge; for which reason a necessity arises of bringing the Broad Gauge Rails parallel to the Narrow Gauge Rails, for the purposes of transhipment.

Having parted with our Gloucester carriages and picked up the Gloucester branch traffic as described, we proceeded to the point where the Broad and Narrow Gauges become mingled, which is at a place called Barnwood. In order to get on to the down track of the Bristol and Birmingham Narrow Gauge Line, we here crossed the Up-Line of that Railway again, as we had within a quarter of a mile already done once before. We were now on the Mixed Gauge; on getting on to it we got a sharp shake, and the road itself between this and the point where the Broad Gauge Rails turn off to the Cheltenham Station was somewhat rough, but not particularly so.

Near Barnwood, where the Broad Gauge Rails turn off towards Standish, avoiding the Gloucester Station, there are Broad Gauge Lines laid down in a manner which cannot be explained without a diagram, to enable Broad Gauge Short Trains from Cheltenham (that is to say, Trains proceeding no further than Gloucester) to run straight into Gloucester. The Broad Gauge Trains going into Gloucester, however, by means of these Lines, must cross the Up-Line of the Bristol and Gloucester Line once, the Spur Line (see *ante*) once, and then both the Up and Down Lines of the Birmingham and Gloucester—a very hazardous course.

The additional switches, fixed points, over-crossing points, and crossing

points occasioned by the intersection and mixture of the Gauges between Gloucester and Cheltenham, I roughly counted as follows:—

Four fixed points (two meeting the Trains); five pairs of double-tongue switch (three meeting the Trains); two half-switches; nineteen pairs of over-crossing points; twenty-five crossing points.

The main Lines of Rails intersect or run completely across each other (in addition to the intersections of single Rails at turn-offs) *no less than ten times*.

The necessary result of these fearful complexities is, that the speed has to be reduced to a walking pace three times between Gloucester and Cheltenham—a distance of seven miles; and that the last mile into Gloucester has to be performed at little above a walking pace. A complexity of signals is also requisite, altogether exceeding belief, which complexity is increased by two systems of signalling obtaining on the two Gauges. Strange as it may seem, I actually stood in one spot near Gloucester and counted ten different signal posts of several forms.

On reviewing the Double Gauge Line between Cheltenham and Gloucester, I could not avoid being struck by the fact, that in consequence of the mixture of Gauges, there are separate Stations at each town; that two sets of stock are provided, two establishments of servants are kept up, and a double number of Trains are run, which are precisely the arrangements which Mr. Stephenson, in his Report on the Double Gauge, declared would be necessary in order to obtain any use from the Double Gauge, and which arrangements are such as he estimates cost an average sum equivalent to 18,000*l.* per mile, in addition to the ordinary cost of even a Broad Gauge Railway.

So that, so far as the experiment of working a Mixed Gauge between Cheltenham and Gloucester proves anything, it would appear to verify precisely the predictions of Mr. Stephenson.

There are no less than twenty-six Passenger Trains running each way, for the accommodation of the not very enormous traffic between Gloucester and Cheltenham; eight trains a day each way would certainly afford ample accommodation for this traffic. I was amused to hear that goods were carted from one Broad Gauge Station (that of the Bristol and Gloucester Line) at Gloucester, to the other Broad Gauge Station (that of the Great Western Line), also at Gloucester, not fifty yards distant from each other, as the crow flies, but, owing to the complexity of Lines attending the mixture of the Gauges, nearly *two miles* distant by Railway, for which reason it is found easier to cart the goods across than to shunt the heavy

trucks of the Broad Gauge from Station to Station. The road actually beats the Railway in this instance.

The general conclusion to which I came, from my visit, was, that the mixture of Gauges resulted in a form of Railway so unsafe, so intricate and broken up, and so extravagant in point of expense, as to render it altogether inadmissible as a practical arrangement, and ruinous to that simplicity on which the utility and safety of Railways depend.

In ensuing Parliamentary contests we shall hear a great deal of this Cheltenham Line, we shall have ignorant audacity proclaiming it as a complete triumph of the Mixed Gauge system, so that perhaps the reprint of this description may not be useless.

For the same reason I give the following condensed report of the evidence of Mr. Robert Stephenson, published by me last session,\* in order that it may be seen how entirely his evidence is borne out by our experience since, and by the conditions on which the Anti-Commercial Railway Commissioners extend the Mixed Gauge.

“ I have been brought up a miner ; and I know what the difficulties of the mixture of the Gauge are, and the effect of the Break of Gauge. The handling of coal forms a very important element in the cost of production ; I cannot conceive anything more disastrous to a coal district than anything like a change of carriage, anything like uncertainty or mixture of systems, or a complication of machinery in conveying them about. The first practical inconvenience of the Mixed Gauge would be that of complexity and great danger. It would not produce very much danger on Lines where the speeds are very moderate, and where the stations are few, and where the getting off the line is a very rare occurrence ; but one of the *essential features of a Railway is extreme simplicity*. The proportion of accidents, taking it over several hundred miles of Railway, has been as high as nine to one, where the points of crossing exist, as compared with where they do

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\* Danger to Travellers, and Injury threatened by a Combination of the Broad and Narrow Gauges, proved from the Evidence of Stephenson, Locke, and Brunel.



not exist. The mixture of Gauges will multiply those points and crossings more than double—sometimes quadruple them—independently of increasing the expense of constructing the Line at least 6,000*l.* a mile.

“ Last year the attention of the resident engineer of the Midland Lines, which extend over five or six hundred miles, was drawn to the question of accidents at points and switches; and the return of accidents which he makes for twelve months, at places where crossings and points have occurred is as nine to one, compared with those occurring on the plain simple railway.

“ In the case of points and switches, you must depend on the vigilance of the men employed. Self-acting machinery may meet theoretically the case intended, but it never can be depended upon. A fall of snow or hard frost has deranged the switches over and over again; so that you are obliged to have men to manage your switches to begin with, and an additional number of policemen. In the next place, it is a matter of uncertainty, depending on the attention of the men. You have a certain risk to run with men, and they sometimes miss their mark; in fact, one of the worst accidents that ever occurred on the Birmingham Line, was from the neglect of a man not turning the switch, near Coventry.

“ Intersections of the lines of rails weaken the adjacent parts; and not only do that, but the break of a rail (which, of course, is most perfect when continuous) cannot occur without a jar, and these jars consequently fracture axles, and those axles will proceed for weeks together, and break suddenly afterwards.”

**INCREASE OF POINTS.**—“ Now as to how the mixing of the Gauge is to multiply the points. At the junction of a railway—that is, a branch passing off. The switches are those which we call points, where the one rail diverges from and does not intersect the other. For the purpose of elucidating, I have had a sketch taken of the Windsor Station on the Great Western Railway, with a view of introducing into it the Mixed Gauge, taking the very arrangement that is deemed the best of the Great Western Railway. I thought an objection might arise to not taking a station on any of my own lines; this is a sketch. I do not pretend to precise accuracy, but it sufficiently exemplifies the case. The number of switches in the present station which require attention are eighteen in number, the number of switches that must be introduced on the Mixed Gauge is thirty-one; the number of crossings or intersections of the rails are twenty-five at present existing, and the least number required by a

mixture will be forty-three. There is another description of crossing which is distinguished among engineers (over crossings), perhaps I had better mix them together. The number of crossings existing is about thirty-seven, I will not be answerable as to one or two; the number that will be required, supposing that thirty-seven be correct, by the Mixed Gauge at that one station, will be seventy-seven, and each of those crossings and points cost about 50*l*. That is the contract price. This is on the question of points and crossings alone. It also involves this inconvenience, that if you have a Mixed Gauge, you must have a mixed stock of plans of Carriages and Waggons; therefore, when you have got a mixed stock, you must also keep them quite distinct from each other, otherwise they could not be made available for trains running up on the wide or narrow, as the case may be, for either of them may come up—you do not know which—and unless you have your station so arranged, as to get access to any description of carriage, without moving another, very great delay takes place. In fact, by far *the better way is to duplicate the stations; that is, to have one station placed at the end of the other, so as to avoid the mixture of carriages, which would lead to double the number of switches, and still would not get rid of the danger which must always attend the breaking of a line of rails.* On a turntable you cannot have three rails, you must have four rails; you cannot turn a carriage unless it is concentric; three rails for the Narrow Gauge carriage would not be concentric. There is no difficulty that ingenuity will not suggest some remedy for; but practically speaking, the mixture of Gauges *will never be worked for any length of time, it will be tried, and the sooner the better for the country, but it will be abandoned hereafter.*

“A mineral district which is to be joined frequently by tram ways from the side, tends to render the Mixed Gauge still more perplexing. As ordinary Branch Railways amongst the mines, they do not get that attention paid to them which a great public Line of Railway does; they would be in an extremely bad state. It is increasing the expense to every individual coal-owner in getting to the Line of Railway.

“Take the case of a mine-owner wishing to lay a branch into a Mixed Gauge system, he must have two sets of plant, or encounter the Break of Gauge. The Break of Gauge is the least evil of the two.”

INEFFICIENCY.—“In that case, the Narrow Gauge existing with the Broad Gauge, would give no facilities to the Companies who communicate with them in that district in the Narrow Gauge? *I think the mixture of*

*Gauges a great deal worse than the Break of Gauge ; I take it between Worcester and Wolverhampton, it only produces one advantage to the parties in that district, it enables any one to go between those two districts, but to any other point beyond Wolverhampton on the one hand, or Worcester on the other without a change of Gauge, but it does not admit of any one coming beyond Wolverhampton, or beyond Worcester, going to the country beyond without their having no change of Gauge. In fact, it is nothing more nor less than this dividing the change at Worcester into two parts, half at Wolverhampton, and the other at Worcester, except as regards the Liverpool and Bristol and Liverpool and Oxford, it would multiply the number of Breaks of Gauge in this country ; I believe the mixture of Gauges, when fairly considered, will go to aggravate the evil of the Break of Gauge. I can look upon it in no other light.*

“ When the Gauges overlap each other, although any one residing within the overlap gets rid of the inconvenience of a Break of Gauge, nobody residing beyond the overlap gets any convenience at all, but two Breaks instead of one. That overlap implies the necessity of working double the number of Trains and having double the amount of stock. Supposing the communication between Liverpool and Bristol, which is very large, and the number of trains arriving at Wolverhampton, may be six in a day, going towards Bristol, and in the opposite direction from Bristol to Liverpool, six more arrive at Cheltenham, where the two Gauges are mixed when they arrive at those points, unless you continue both the Narrow Gauge Trains and the Broad Gauge Trains for the mixed Gauge Line, you do not give the country lying beyond the accommodation of the Trains running from that country, therefore it is, as between any point beyond the overlap, double the number of Trains running.

“ There is no experience yet of the working of a Mixed Gauge. I do not deny that the addition of a third Rail into a common Railway *where there are no stations or intermixture from side to side*, is as plain, vulgarly speaking, as a flagstaff.

“ On the Mixed Gauge, the trains must have different signals. The policeman sees the trains coming up, and he will not know which it is until it comes near ; and the same specific and obvious signal must be made use of. In case of fogs, *there will be a light ; but that light will be indistinct. The moment you begin to multiply the mechanical apparatus of a Railway, you begin to render it a less perfect machine.* Therefore, it has been my study, and it is the study of every engineer, in the Stations

of Railways, to avoid those points and crossings to the utmost possible extent; and any one, in considering the arrangements of a Simple Gauge, will tell you that one of the first things in doing this is, to avoid the multiplication of points and crossings. If on a Single Gauge, where the danger is comparatively small, the proportion of accidents is proved to have been nine to one, how much more will it be when the crossings are quadrupled.

“ I do not think Cheltenham and Gloucester will be a fair trial—it will be a straight line, without many indentations. (See ante p. 25.) I have told Mr. Brunel that I have no objection to his doing anything he likes in carrying out the mixture of the Gauge between Cheltenham and Gloucester; but I will never sanction the introducing of a Mixed Gauge into the Stations. He has his own way on the Cheltenham and Gloucester Line; but I prohibited him going into the Stations.”

*Inefficacy of the Mixed Gauge to remove the evils of the Break of Gauge.*

The professed object of the Mixed Gauge is to remove the evils of the Break of Gauge.

It will entirely fail to remove that defect which the Great Western and Mr. Brunel have succeeded in introducing into our Railway system, and it creates dangers, expenses, and delays hitherto unknown.

It might be some satisfaction, some consolation to those who deplore the ruinous waste of capital involved in our Railway system, some excuse for the false pretences on which the Mixed Gauge system has been reared, if the advocates of Mixed Gauge could say, true, by these evils the chances of accident are increased manifold; true, our complicated system is rendered more complicated; true, travellers are made more and more dependent on the accuracy, the watchfulness, health, the eyesight, the sanity of policemen, signalmen, and switchmen; true, at a time of

général railway depression, a tax is laid either on Shareholders or traffic equal to 1000*l.* a mile per annum; but then we have smoothed over for ever the Break of Gauge; we have placed the whole Railway system of the kingdom in harmonious communication; we have put an end for ever to those Gauge contests before Parliamentary Committees, on which, for week after week, 1000*l.* per day has been expended on each side, without either shareholders, or travellers, or owners of Railway-sent goods, deriving any more benefit than if the same sum had gone in firing salutes and sending up rockets. Unfortunately, the very reverse is the fact.

If by happy accident these sanctioned Mixed Gauge Lines should fulfil the hopes of the Commissioners by being worked for one twelvemonth without accident to life or limb—if no Railway inspector should be sent head foremost off the line in a first-class carriage at a crossing—if no one of her majesty's ministers should experience the misery of a collision through the mistake of a switchman, then we may expect to see Parliamentary contests between the Gauges, on which 900,000*l.* have already been wasted, commenced with more vigour than ever, while Broad Gauge, and Break of Gauge, and three or four railed Mixed Gauges, are pushed from town to town in search of a dividend, like Peter Schimel in search of his shadow.

"It is important to observe," to quote the words of Mr. R. Stephenson's Report, "that the termini of this Mixed Gauge system, introduced to remedy the evils of the Break of Gauge, become themselves again the sites of other Breaks of Gauge, at one or other of which all through traffic from a Narrow Gauge to a Broad Gauge district, or *vice versâ*, must be transferred. Thus, by the Mixed Gauge system, the evils hitherto confined to one district will be repeated in new and distant parts of the country.

"The Break of Gauge, in short, cannot be remedied by the mixture of

Gauges, until such mixture becomes co-extensive with Railways themselves, and thus, after enormous expense, we should arrive at last at uniformity, but without the simplicity of construction and arrangement which can alone insure the economy, safety, and inefficiency of the Railway system."

The truth of these remarks will be made clear by referring to the map facing page 5, which shows the effect of the introduction of a Mixed Gauge on the Oxford and Rugby, and Birmingham and Oxford Junction Lines. Narrow Gauge trucks from Liverpool, on the north, will find a Narrow Gauge Break of Gauge at Oxford; and trucks or travellers from Bristol or Exeter, will find a Broad Gauge Break of Gauge at Rugby and at Birmingham.

### *The true Origin of the Mixed Gauge.*

Amid all the reasons given for making the Mixed Gauge, the only true reason is a desire to extend the Broad Gauge—that is to say, to upset the decisions at which the Gauge Commissioners and Parliament arrived at so much pains in 1846.

I will not now discuss the statement of the Commissioners that Parliament, in passing the Gauge Act, did not intend to carry out the Gauge resolutions. That is an assumption which is totally contradicted by all the discussions which took place on the subject in Parliament in 1846 and 1847, by the speeches of Lord Clarendon, Mr. Milner Gibson, and Mr. Russell, chairman of the Great Western, when the Gauge Act was debated.

It is worthy of note, that, in 1846, in the discussion of the Gauge Act, Mr. Labouchere, then in opposition, now

Chief Commissioner of Railways, appeared as an advocate of Great Western views, and claimed a greater extent of territory for the Wide Gauge, in what was then considered a final settlement. Mr. Labouchere is M. P. for Taunton.

To slip through the flagrant breach of the spirit of the Gauge Act, and the contradictions of the Gauge Report, Sir Edward Ryan, the ex-Indian Judge, who, for some occult reason, was made a Railway Commissioner, in conjunction with the Master of the Buckhounds, has obtained a private letter from Mr. Airy, the Astronomer-Royal, and late Gauge Commissioner, in which, while adhering to his opinions in favour of a uniform Narrow Gauge all over the kingdom, he expresses an abstract opinion in favour of a Double Gauge Railway—that is to say, *two* Wide Gauge rails outside two Narrow Gauge rails, for the purpose of making use of the more swift and powerful Broad Gauge engines to convey traffic on certain great Trunk Lines, which he recommends to be entirely conducted all over the kingdom on Narrow Gauge carriages and trucks; that is to say, he thinks a uniform Narrow Gauge for passengers and goods indispensable, but he has no objection to a Break of Gauge for engines.

He says—

“ I have no hesitation in saying that a Railway with a Break of Gauge is totally useless for goods traffic. . . . Without seeing the actual traffic, a just idea can hardly be formed of the wandering character of goods waggons. At Gloucester, I have seen coal waggons from Stavely (beyond Chesterfield). *The Manchester cottons and Newcastle glassware, intended for Exeter*, ought to travel in the same waggons all the way from Manchester and Newcastle. I say nothing of the proposals (*by Mr. Brunel*) for alleviating the *inconvenience of a Break of Gauge by mechanical contrivances*, believing that the actual introduction of these contrivances into practical use was never seriously contemplated.”

He proceeds to say that, as to passengers—

“The carriages on the Broad Gauge must not only be very broad, but also very long. There will sometimes be an enormous amount of dead weight in the trains. In this point, therefore, the Narrow Gauge has a slight advantage; but in regard to goods trains, the Narrow Gauge has a very great advantage. In the course of a goods train, the usual method at road stations must be not to unload and load waggons, but to take up additional waggons to the train, and drop waggons from the train. Therefore, at any town where the daily traffic forms only part of a waggon load, either there must be carried with those goods a great amount of dead weight, or the goods must wait for accumulation, and the benefit of quick conveyance must be totally lost. And if, as seems probable, Railways should be extended to the smaller towns and the larger villages, with private branches (worked by horses), even to large farm-yards, the success of this extension must depend entirely on the adoption of a Narrow Gauge. At the same time, it appears the Narrow Gauge waggons are competent to the conveyance of any load required in practice.” \*

Mr. Airy, after stating that he considers Broad Gauge engines swifter and more powerful, and therefore cheaper for very heavy loads than Narrow Gauge engines, goes on to say—

“The Government of the country will not have done its duty in the matter of Railways, until such arrangements shall be made that loaded Railway carriages may travel from one end of the kingdom to the other without interruption, and this can only be effected by carrying one Gauge of Rails through the whole country.

\* \* \* \* \*

“I think the Narrow Gauge greatly superior to the Broad Gauge for the course of passenger carriages and goods carriages. Therefore, in

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\* In the United States, on Narrow Gauge Lines, trucks are used thirty feet long, which contain 14 tons each. In England, Narrow Gauge engines have drawn 1000 tons at a time.



my opinion, the one Gauge to run through the country ought to be the 4 ft. 8½ in. Gauge.

“ But I should think it very desirable, if possible, to combine with this convenience of Narrow Gauge for carriages the advantages of the Broad Gauge for engines, in those cases where, from the weight of the trains, the advantage becomes considerable.”

Mr. Airy then proceeds to explain that he wishes, on great Trunk Lines, a Double Gauge to be laid — the Wide for engines, the Narrow for carriages. In favour of this proposition he pleads not only the speed of the Broad Gauge, but his respect for the talents of Mr. Brunel, and his desire to encourage inventions.

On these terms, we only require a 9 feet Gauge Brunel to be totally ruined.

*Professor Airy and Captain Simmons.*

I will presently show the illogical use to which the Railway Commission have put this gratuitous contribution from the Astronomer-Royal, but I must here assert that, tried by a commercial test, the only test for an *implement or tool of commerce*—and a Railway is nothing else—this letter proves all that the advocates of a uniform Narrow Gauge require.

The plea for the Broad Gauge engine, on the ground of the economy of its power would, if true, be good as an argument for a uniform Wide Gauge — on this point I again refer to the tables of third-class passengers and fares, in pp. 23, 25 *ante* ; but it is absurd to talk of an economy to be effected by adding a complete Broad Gauge Railway, at an expense of 20,000*l.* a mile, to the already sufficiently expensive Narrow Gauge.

Mr. Airy admits the superiority of the Narrow Gauge

for goods, minerals, and agriculture. He admits and urges the importance of a Uniform Gauge. The superior speed on which he dwells is confined to passengers on the Great Western (the most level Line in the kingdom) by express trains.

The express passengers on all the Railways in England do not amount to five per cent. of the whole passenger movement. \*

Does Mr. Airy seriously mean that in the present depressed state of Railway property, as well as of every kind of trade and pursuit, while the embryo Railways to "small towns, large villages, and large farms" are indefinitely postponed, it is expedient to lay out 2,000,000*l.* sterling in a Mixed Gauge, in order that five per cent. of Railway passengers may arrive an hour sooner at the end of a journey of 100 miles?

In practice the Mixed Gauge would be slower than the Narrow Gauge; for it would be impossible to run at express speed over such a multiplicity of points and crossings.

The Gauge which Mr. Airy admits to be so superior for merchandize has also, in fares, accommodation, and speed, proved itself the best for travellers by ordinary and third-class trains.

Captain Simmons rejects Mr. Airy's Double Gauge system as too expensive. There is this difference between the two plans. Captain Simmons saves by his plan a thousand pounds or so a mile in an expenditure of from 10,000*l.* to 20,000*l.* a mile, and makes a dangerous expensive addition to Railways, without one jot alleviating the evils of Breaks of Gauge.

\* Speed on Railways considered in a Commercial point of view.

Mr. Airy's plan is less dangerous perhaps, but still dangerous, more expensive by a trifling sum, a frightful waste of money in all, but it cures the evil.

*The Principle of the Commissioners' Decision.*

If the Railway Commissioners had been guided by any distinct principle, they would have so decided as to put at rest the question between the Gauges for ever. Even Mr. Airy sees this, amid all his ignorance of "profit and loss," an ignorance that may easily be excused, considering the constant important labours he renders to the cause of science. They make use of so much of Mr. Airy's letter as helps them to get rid of the principle of the Gauge Act, but, while they express anxiety to extend the "peculiar properties of the Wide Gauge" to other districts, they make no sign of extending the undoubted advantages of the Narrow Gauge for coals, for agricultural produce, for roadside produce to the West of England.

They believe the Mixed Gauge will work. All the engineering profession, except Mr. Brunel and Captain Simmons, believe it will not. But as they have faith in the Mixed Gauge, how is it that they do not propose to extend the undoubted advantages of the Narrow Gauge to Bristol?

How is it that they have done their best to consign the West of England, Devon, and Cornwall, to the dominion of the Broad Gauge, which Mr. Airy condemns as unsuitable for goods and coal, and ore and farm traffic? In their report on the Taw Vale Line, the Line intersecting the district which, according to Mr. Airy, is most suited to a Narrow Gauge Line, not a word, not a hint is given

of the propriety of extending the peculiar advantages of the Narrow Gauge to the West. How is it that they sanction *competition* on a *Mixed Gauge* to Birmingham, which they so strongly condemned in a Simple Railway, in the following passage of a Report, dated 31st March 1848, and signed Edward Strutt, Granville, and Edward Ryan?

“ When railways were first established, it was supposed that a railway might be the property of one Company, and that the traffic upon it might be carried on by other Companies, or by private individuals, as in the case of canals. Had this system been practicable, the principle of competition would have been applicable to railways, with the single exception of the toll payable to the proprietors of the line. But experience soon proved that this mode of conducting the traffic was totally impracticable. The liability to accidents by collision, especially in the case of passenger trains travelling at high speeds, is of itself a consideration sufficient to show the necessity of placing all the trains on a railway under some common management and control. Although in certain cases a second Company has been allowed to make use of a railway, generally for a short distance, and subject to strict conditions as to management, it may now be assumed to be a rule, established by experience, that the working of each line must ordinarily be entrusted to the management of a single Company, and that the principle of competition is not applicable to such an undertaking.”

Is this attributable to ignorance or corruption, to the Parliamentary influence of the Great Western, or that insolent aristocratic indifference which cares only for the 5 per cent. of express passengers?

With such specimens of official incompetence before me, I may venture to quote words written last year :—

“ The high fares of the Broad Gauge, the neglect of local traffic, the circuitous route, the crawling pace and wretched accommodation of its enforced cheap trains, its many failures, its many broken promises, its perpetual wrangles, suits, and sharp practising with its allies, are all pardoned, in consideration of the costly exclusive Express, and the courteous attention invariably paid to the notabilities who happen to honour its platforms.

"Our financiers, and would-be financiers—our Conservatives by profession—our patriots by trade—rise nightly in either House of Parliament to deplore the waste of capital, the fatal abstraction of funds from legitimate commerce, caused by Railway enterprise; while the Radical popularity-hunter puts in his claim for first-class carriages at third class fares; and, after these prudent and patriotic effusions, the Bowrings, the Goulburns, and the Broughams, agree on supporting competition and Double Gauge Railways,—that is to say, they vote first for making another Railway where one already exists, ready, willing, and able to do the work, at the cheapest possible rate; and next, they ordain that this Railway shall be formed by rolling two Lines into one.

"Even if the country be overflowing with capital, it would only be just that the poorer districts should be supplied before the richer have their accommodation doubled; but if capital be scarce, there are the strongest possible reasons for enforcing the cheapest modes of construction, and prohibiting competition with old Lines willing to adopt reasonable tariffs until the unsupplied districts have been traversed.

"Perhaps, in a few years' time, when, by universal consent, the complicated Gauge, proved to be dangerous and inefficient, is abandoned, our Peels, Barings, and Humes, will regretfully calculate what Diversity of Gauge, and the consequent compromise, the Mixed Gauge, has cost, and what the sum wasted on it would have done for the revenues of the State—for the Dividends of shareholders—and for the accommodation of those labouring masses, who, not rich enough to travel by express Trains—nor powerful enough to be heard in Parliamentary Committees—will not always remain passive when they learn that, under the plea of affording the maximum of speed and the maximum of luxury to a select few, a selfish conspiracy has confined the many to the minimum speed and the minimum of accommodation—for such is the policy and the practice of the Broad Gauge Great Western Railway."

If our Government is too weak to resist Great Western influence, too much devoted to the aristocracy to deny them the luxury of the Broad Gauge Express, let them broadly declare in favour of *Parallel*, not *Mixed Broad and Narrow* Gauge Lines. Let them act fairly—grant to the West of England the incontestible advantages of the Narrow

Gauge, which I will sum up in the following comparative table:—

*Comparative Merits of Broad and Narrow Gauge Railways.*

*Narrow Gauge.*

Narrow Gauge Fares cheaper by 21 per cent. for first class passengers, 22 per cent. for second class passengers, and on all passengers by 33 per cent.

*Convenience.*

Frequent Trains for third class passengers, raising their number from 50 per cent. to 90 per cent. of gross movement, instead of 15 per cent. as on the Broad Gauge.

Attention to small traffic.

*Coals and Minerals.*

Narrow Gauge Trucks and Rails universally preferred.

Carriers prefer Narrow Gauge for goods.

*Broad Gauge.*

SPEED OF EXPRESS TRAINS.

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